UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION IV
612 EAST LAMAR BLVD, SUITE 400
ARLINGTON, TEXAS 76011-4125

April 26, 2011

Mr. Adam C. Heflin, Senior Vice
President and Chief Nuclear Officer
Union Electric Company
P.O. Box 620
Fulton, MO 65251

SUBJECT: CALLAWAY PLANT – NRC COMPONENT DESIGN BASES INSPECTION NRC INSPECTION REPORT 05000483/2011006

Dear Mr. Heflin:

On March 18, 2011, the U.S. Nuclear Regulatory Commission (NRC) completed the onsite portion of a component design bases team inspection at the Callaway Plant. The enclosed report documents our inspection findings. The team conducted an exit on March 18, 2011, with Mr. F. Diya, Vice President Nuclear Operations and Mr. C Reasoner, Vice President Engineering and other members of your staff.

The inspection examined activities conducted under the conditions of your license as they relate to safety and compliance with the Commission's rules and regulations. The team reviewed selected procedures and records, observed activities, and interviewed cognizant plant personnel.

This report documents two NRC identified findings of very low safety significance (Green) and one Severity Level IV noncited violation. The findings were determined to involve violations of NRC requirements. Additionally, a licensee-identified violation which was determined to be of very low safety significance is listed in this report. However, because of the very low safety significance and because they were entered into your corrective action program, the NRC is treating these findings as noncited violations, consistent with the NRC Enforcement Policy. If you contest the noncited violations or the significance of the noncited violations, you should provide a response within 30 days of the date of this inspection report, with the basis for your denial, to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, D.C. 20555-0001, with copies to the Regional Administrator, U.S. Nuclear Regulatory Commission, Region IV, 612 E. Lamar Blvd, Suite 400, Arlington, Texas, 76011-4125; the Director, Office of Enforcement, U.S. Nuclear Regulatory Commission, Washington, D.C. 20555-0001; and the NRC Resident Inspector at the Callaway Plant facility. In addition, if you disagree with the crosscutting aspect assigned to any finding in this report, you should provide a response within 30 days of the date of this inspection report, with the basis for your disagreement, to the Regional Administrator, Region IV, and the NRC Resident Inspector at Callaway.

In accordance with 10 CFR 2.390 of the NRC's Rules of Practice, a copy of this letter and its enclosure will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records component of NRC's document system (ADAMS). ADAMS is accessible from the NRC Website at http://www.nrc.gov/reading-rm/adams.html (the Public Electronic Reading Room).

Sincerely,

T. R. F

Thomas R. Farnholtz, Chief
Engineering Branch 1
Division of Reactor Safety

Docket: 50-483
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Inspection Report 05000483/2011006

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U.S. NUCLEAR REGULATORY COMMISSION

REGION IV

Docket:	05000483
License:	NPF-30
Report Nos.:	05000483/2011006
Licensee:	Union Electric Company
Facility:	Callaway Plant
Location:	Junction Highway CC and Highway O Fulton, Missouri
Dates:	February 14-18, 2011, On site February 21-25, 2011, In office February 24 through March 4, 2011, On site March 7 -11, 2011, In office March 14-18, 2011, On site
Team Leader:	W. Sifre, Senior Reactor Inspector, Engineering Branch 1
Inspectors:	J. Adams, Reactor Inspector, Engineering Branch 1 S. Makor, Reactor Inspector, Engineering Branch 2 M. Bloodgood, Operations Engineer, Operations Branch F. Baxter, NRC Contractor, Beckman and Associates H. Campbell, NRC Contractor, Beckman and Associates
Approved By:	Thomas R. Farnholtz, Branch Chief Engineering Branch 1

SUMMARY OF FINDINGS

IR 05000483/2011006, On site February 14-18, February 28-March 4, and March 14-18, 2010; In office February 21-25, March 7-11, Callaway Plant: baseline inspection, NRC Inspection Procedure 71111.21, "Component Design Bases Inspection."

The report covers an announced inspection by a team of four regional inspectors and two contractors. Three violations of significance were identified. The significance of most findings is indicated by their color (Green, White, Yellow, or Red) using Inspection Manual Chapter 0609, "Significance Determination Process," and the crosscutting aspect was determined using Inspection Manual Chapter 0310, "Components within the Cross Cutting Areas." Findings for which the significance determination process does not apply may be Green or be assigned a severity level after NRC management review. The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG-1649, "Reactor Oversight Process," Revision 4, dated December 2006.

A. NRC Identified Findings

Cornerstone: Mitigating Systems

SLIV. The team identified a Severity Level IV, noncited violation of 10 CFR 50.71, "Maintenance of records, making of reports," paragraph (e) which states, in part, "Each person licensed to operate a nuclear power reactor shall update periodically the updated safety analysis report originally submitted as part of the application for the license, to assure that the information included in the report contains the latest information developed." Specifically, the licensee incorporated numerous errors in the updated safety analysis report associated with the descriptions of the onsite electrical power systems. The licensee has entered this violation into their corrective action program as Condition Reports 201101335 and 201102064.

The inspectors determined that the failure to update the updated safety analysis report as required by 10 CFR 50.71(e), "Maintenance of records, making of reports" was a performance deficiency. This finding was evaluated using traditional enforcement because it had the potential for impacting the NRC's ability to perform its regulatory function. The inspectors used the NRC Enforcement Policy, dated September 30, 2010, to evaluate the significance of this violation. Consistent with the NRC Enforcement Policy, this finding was determined to be a Severity Level IV noncited violation. This finding has no crosscutting aspect as it was associated with a traditional enforcement violation. (Section 1R21.2.1)

Green. The team identified a Green noncited violation of 10 CFR Part 50, Appendix B, Criterion III, "Design Control," which states, in part, that "Measures shall be established to assure that applicable regulatory requirements and the design basis are correctly translated into specifications, drawings, procedures, and instructions." Specifically, when designing the bypass circuitry for the emergency diesel generator ground fault trip function, the licensee failed to ensure that the associated electrical components were adequately designed for the continuous duty they would have to withstand under bypassed trip conditions. This could result in an ignition source and subsequent fire in the area under these conditions. This finding was entered into the licensee's corrective action program as Condition Report 201102064.

The team determined that the failure to analyze the suitability of the emergency diesel generator components when protection features were bypassed was a performance deficiency. This finding was more than minor because it was associated with the design control attribute of the Mitigating Systems Cornerstone and affected the cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Specifically, the inadequate design of these components could have prevented continued operation of the emergency diesel generator under ground fault conditions with the trip signal bypassed. In accordance with NRC Inspection Manual Chapter 0609, Attachment 4, "Phase 1 - Initial Screening and Characterization of Findings," the issue was determined to have very low safety significance (Green) because it was not a design or qualification deficiency, did not represent a loss of system safety function, and did not screen as potentially risk significant due to a seismic, flooding, or severe weather initiating event. Specifically, the licensee revised the associated procedures to include these components in the combustible material exclusion zone. This finding did not have a crosscutting aspect because the most significant contributor did not reflect current licensee performance. (Section 1R21.2.2)

Green. The team identified a Green noncited violation of 10 CFR Part 50, Appendix B, Criterion III, "Design Control," which states, in part, that "Measures shall be established to assure that applicable regulatory requirements and the design basis are correctly translated into specifications, drawings, procedures, and instructions." Specifically, as of March 3, 2011, the Mode 6 residual heat removal system low flow alarm setpoint did not adequately account for flow measurement uncertainties, and consequently was non-conservative. The licensee has entered the violation into their corrective action program as Condition Report 201101750.

The team determined that the failure to adequately analyze the uncertainty in measurement of residual heat removal system flow, and the impact of this failure, was a performance deficiency. This finding was more than minor because it was associated with the design control attribute of the Mitigating Systems Cornerstone and affected the cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Specifically, the design basis analysis, and plant instrumentation, did not ensure that, while operating in Mode 6, the control room operators would be alerted whenever the residual heat removal system flow through the reactor coolant system was below the required value of 1000 gallons per minute. In accordance with NRC Inspection Manual Chapter 0609, Attachment 4, "Phase 1 - Initial Screening and Characterization of Findings," the issue was determined to have very low safety significance (Green) because it was not a design or qualification deficiency, did not represent a loss of system safety function, and did not screen as potentially risk significant due to a seismic, flooding, or severe weather initiating event. This finding did not have a crosscutting aspect because the most significant contributor did not reflect current licensee performance. (Section 1R21.2.15)

B. Licensee-Identified Violations

One violation of very low safety significance, which was identified by the licensee, has been reviewed by the inspectors. Corrective actions taken or planned by the licensee have been entered into the licensee's corrective action program. This violation and corrective action tracking number (Callaway action request number) is listed in Section 4OA7.

REPORT DETAILS

1 REACTOR SAFETY

Inspection of component design bases verifies the initial design and subsequent modifications and provides monitoring of the capability of the selected components and operator actions to perform their design bases functions. As plants age, their design bases may be difficult to determine and important design features may be altered or disabled during modifications. The plant risk assessment model assumes the capability of safety systems and components to perform their intended safety function successfully. This inspectable area verifies aspects of the Initiating Events, Mitigating Systems and Barrier Integrity Cornerstones for which there are no indicators to measure performance.

1R21 Component Design Bases Inspection (71111.21)

.1 To assess the ability of Callaway plant equipment and operators to perform their required safety functions, the team inspected risk significant components, and the licensee's responses to industry operating experience. The team selected risk significant components for review, using information contained in the Callaway Plant Probabilistic Safety Assessment and the U. S. Nuclear Regulatory Commission's (NRC) standardized plant analysis risk model. In general, the selection process focused on components that had a risk achievement worth factor greater than 1.3 or a risk reduction worth factor greater than 1.005. The items selected included components in both safety-related and nonsafety-related systems including pumps, circuit breakers, heat exchangers, transformers, and valves. The team selected the risk significant operating experience to be inspected based on its collective past experience.

To verify that the selected components would function as required, the team reviewed design basis assumptions, calculations, and procedures. In some instances, the team performed calculations to independently verify the licensee's conclusions. The team also verified that the condition of the components was consistent with the design bases and that the tested capabilities met the required criteria.

The team reviewed maintenance work records, corrective action documents, and industry operating experience records to verify that licensee personnel considered degraded conditions and their impact on the components. For the review of operator actions, the team observed operators during simulator scenarios, as well as during simulated actions in the plant.

The team performed a margin assessment and detailed review of the selected risk significant components to verify that the design bases have been correctly implemented and maintained. This design margin assessment considered original design issues, margin reductions because of modifications, and margin reductions identified as a result of material condition issues. Equipment reliability issues were also considered in the selection of components for detailed review. These included items such as failed performance test results; significant corrective actions; repeated maintenance; 10 CFR 50.65(a)1 status; operable, but degraded, conditions; NRC resident inspector input of problem equipment; system health reports; industry operating experience; and licensee problem equipment lists. Consideration was also given to the uniqueness and complexity of the design, operating experience, and the available defense in-depth margins.

The inspection procedure requires a review of 15 to 25 samples that include risk-significant and low design margin components, containment related components, and operating experience issues. The sample selection for this inspection was 15 components, one of which is containment related, and 5 operating experience items. The selected inspection and associated operating experience items supported risk significant functions as follows:

1. Electrical power to mitigation systems: The team selected several components in the offsite and onsite electrical power distribution systems to verify operability to supply alternating current (AC) and direct current (DC) power to risk significant and safety-related loads in support of safety system operation in response to initiating events such as loss of offsite power, station blackout, and a loss-of-coolant accident with offsite power available. As such the team selected:

    - Auxiliary Electric Power System
        - NRC Generic Letter 2007-01, "Inaccessible or Underground Power Cable Failures that Disable Accident Mitigation Systems or Cause Plant Transients"
        - NRC Information Notice 2010-26, "Submerged Electrical Cables"
    - Emergency Diesel Generator Trip Functions
    - Motor Control Center NG01
        - NRC Information Notice 2007-34, "Operating Experience Regarding Electrical Circuit Breakers"
    - Startup Transformer XMR01
        - NRC Generic Letter 2007-01, "Inaccessible or Underground Power Cable Failures that Disable Accident Mitigation Systems or Cause Plant Transients"
        - NRC Information Notice 2010-26, "Submerged Electrical Cables"
    - Emergency diesel generator heating, ventilation, and air conditioning exhaust tornado dampers
    - DC Bus NK01
    - Inverter NN12
    - 4160 Volt Switchgear NB01
        - NRC Information Notice 2007-34, "Operating Experience Regarding Electrical Circuit Breakers"

2. Initiating events minimization systems: The team reviewed several components required to minimize the onset and respond to initiating events. These components were required to provide cooling and mitigate the consequences of analyzed events. As such the team selected:

- Steam Generator A Blowdown Line Isolation Valve BM-HV-001
    - Containment related Component
- Train A Essential Service Water High Density Polyethylene Piping EF-003-AZC
- Containment Recirculation Sump A to Residual Heat Removal Pump A Suction Isolation Valve EJHV8811A
- Emergency Core Cooling System Accumulator Tank TEP01A
- Ultimate Heat Sink
- Non-Safety Auxiliary Feedwater Pump PAP01

3. Decay heat removal systems: The team reviewed components required to perform the decay heat removal function. As such the team selected:

- Residual Heat Removal Pump PEJ01A
    - NRC Bulletin 1988-04, "Potential Safety-Related Pump Loss"
    - NRC Information Notice 1997-90, "Use of Nonconservative Acceptance Criteria in Safety-Related Pump Surveillance Tests"

.2 Results of Detailed Reviews for Components

.1 Auxiliary Electric Power System

a. Inspection Scope

The team reviewed the system design criteria, selected drawings, and operating procedures for the auxiliary electric power system. The team also performed walkdowns, and held discussions with cognizant licensee individuals. Specifically the team reviewed:

- One line diagrams of the associated Co-Op substation
- Specifications of the 15 kV direct burial cable
- Design and nameplate ratings of the 13.8kV to 4.16 kV transformer
- Required specifications for the 4.16 kV cables

- Procedures for connecting Switchgear PB05 to Class 1E Switchgears NB01 and NB02

- DC power supplies associated with Auxiliary Emergency Power System

- Protection features of the Auxiliary Emergency Power System designed to safeguard the Class 1E buses NB01 and NB02

- Transmission System interconnections between the Class 1E buses NB01 and NB02 and the Alternate Emergency Power System 69 kV source

- Interaction between the Alternate Electrical Power System and the Back-Up Station Blackout power source

b. Findings

Introduction. The inspectors identified a Severity Level IV noncited violation of 10 CFR 50.71(e), "Maintenance of records, making of reports" for failure to update the updated safety analysis report. Specifically, the licensee incorporated numerous errors in the updated safety analysis report associated with the descriptions of the onsite electrical power systems.

Description. While reviewing the Callaway Station updated safety analysis report, the inspectors identified several erroneous statements and inconsistencies associated with the discussion of electrical power sources. These errors are described below:

- Section 8.3.1.1.1 states that the unit auxiliary and startup transformer has the capacity to supply both non-Class 1E and both Class 1E load groups simultaneously. This statement is in error because the Unit Auxiliary transformer does not feed any Class 1E loads.

- Section 8.3.1.4.1.1 incorrectly identified the 15 kV and 5 kV power as 1.15 kV and 2.5 kV power.

- The updated safety analysis report describes the station as being in compliance with Regulatory Guide 1.9, Revision 3, and IEEE Std. 387-1977. However, IEEE-387-1977 is endorsed by revision 2 of Regulatory Guide 1.9 and not revision 3. Appendix 3A of the updated safety analysis report adds further confusion in that it states that the licensee has complied with the Safety Evaluation Report (NUREG 0830) which refers to Regulatory Guide 1.9, Revision 1.

Analysis. The inspectors determined that the failure to update the updated safety analysis report as required by 10 CFR 50.71(e), "Maintenance of records, making of reports" was a performance deficiency. This finding was evaluated using traditional enforcement because it had the potential for impacting the NRC's ability to perform its regulatory function. The inspectors used the NRC Enforcement Policy, dated September 30, 2010, to evaluate the significance of this violation. Consistent with the NRC Enforcement Policy, this finding was determined to be a Severity Level IV noncited

violation. This finding has no crosscutting aspect as it was associated with a traditional enforcement violation.

Enforcement. The team identified a Severity Level IV, noncited violation of 10 CFR 50.71, "Maintenance of records, making of reports," paragraph (e) which states, in part, "Each person licensed to operate a nuclear power reactor shall update periodically the updated safety analysis report originally submitted as part of the application for the license, to assure that the information included in the report contains the latest information developed." Contrary to the above, the licensee failed to update periodically the updated safety analysis report originally submitted as part of the application for the license, to assure that the information included in the report contains the latest information developed. Specifically, the licensee incorporated numerous errors in the updated safety analysis report associated with the descriptions of the onsite electrical power systems. The licensee has entered this violation into their corrective action program as Condition Reports 201101335 and 201102064. This finding was characterized as a Severity Level IV violation in accordance with the NRC Enforcement Policy. Because the violation was of Severity Level IV safety significance, this violation is being treated as a noncited violation, consistent with Section 2.3.2.a, of the NRC Enforcement Policy: NCV 05000483/2011006-01, "Failure to Update the Updated Safety Analysis Report."

.2 Emergency Diesel Generator Trip Functions

a. Inspection Scope

The team reviewed the emergency diesel generator operating signals under both accident and non-accident conditions that would initiate an emergency diesel generator trip. The team also reviewed the emergency diesel generator signals that would only initiate alarms. Discussions were held with cognizant licensee individuals. Specifically the team reviewed:

- Updated safety analysis report commitments and emergency diesel generator trip logics
- Licensee commitments to NRC Regulatory Guide 1.9 "Application and Testing of Safety-Related Diesel Generators for Nuclear Power Plants"
- System one line and schematic diagrams
- Sizing and rating specifications for ground fault protection components
- Callaway fire hazards analysis
- Emergency diesel generator room flooding analyses
- Emergency diesel generator room fire protection sprinkler system actuation specifications
- Emergency diesel generator room floor drain design documentation

- Emergency diesel generator alarm operator response procedures

b. Findings

Introduction. The team identified a Green noncited violation of 10 CFR Part 50, Appendix B, Criterion III, Design Control, in that, the licensee did not adequately design components associated with the emergency diesel generator ground fault protection scheme. Specifically, the licensee failed to ensure that the electrical components associated with the emergency diesel generators were adequately designed for the ensuing continuous duty required under analyzed bypassed ground fault conditions. This condition introduced new and unanalyzed failure modes that have existed since initial plant operation. Specifically, the inspectors determined that three components associated with each emergency diesel generator and associated class 1E buses, NB01 and NB02, have ground fault protection schemes that were not rated for the duty they would experience when a ground fault was detected under accident conditions. As a result of the consequential damage from inadequately rated components, including fire, smoke, and arcing, the operators would be forced to shut down the emergency diesel generator and declare it out of service, and also deal with the unanticipated fire, smoke, and arcing hazards.

Description. In accordance with the licensing basis, the emergency diesel generator ground fault protection trip function is bypassed under accident conditions. Although the trip signal is blocked, the ground fault would persist until such time as the operators shut down the emergency diesel generator or the ground fault is interrupted through failure of components in the ground loop. By design, the ground fault current is limited to 400 amps. This is the maximum current that would flow in the ground loop if there were a ground fault. The team reviewed the ratings for the neutral ground fault resistor, the ground fault sensing relay, and the cable connecting the emergency diesel generator neutral to the resistor. The ground fault resistor was found to be rated for 60 seconds duty while drawing 400 amps, the relay had a thermal limit of 19.4 seconds for the equivalent current, and the cable had an adequate current rating but was found to be rated for only 600 volts duty versus a required minimum of 2400 volts. The resistor bank and the relay were adequately rated for short-time duty but not for continuous duty. The cable however was inadequately designed for all operating conditions. The licensee issued Condition Report 201102064 to evaluate the consequences of the failures and arrive at long term corrective actions. The failure of these components could result in ignition and arc flash sources in the emergency diesel generator rooms accompanied by smoke, fire, and high voltage. These conditions would be addressed by existing fire protection response procedures requiring shutdown of the emergency diesel generator. No additional operator compensatory actions were found to be necessary.

Analysis. The team determined that the failure to analyze the suitability of the emergency diesel generator components when protection features were bypassed was a performance deficiency. This finding was more than minor because it was associated with the design control attribute of the Mitigating Systems Cornerstone and affected the cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Specifically, the inadequate design of these components could have prevented continued operation of the emergency diesel generator under ground fault conditions with the trip signal

bypassed. In accordance with NRC Inspection Manual Chapter 0609, Attachment 4, "Phase 1 - Initial Screening and Characterization of Findings," the issue was determined to have very low safety significance (Green) because it was not a design or qualification deficiency, did not represent a loss of system safety function, and did not screen as potentially risk significant due to a seismic, flooding, or severe weather initiating event. Specifically, the licensee revised the associated procedures to include these components in the combustible material exclusion zone. This finding did not have a crosscutting aspect because the most significant contributor did not reflect current licensee performance.

Enforcement. The team identified a Green noncited violation of 10 CFR Part 50, Appendix B, Criterion III, "Design Control," which states, in part, that "Measures shall be established to assure that applicable regulatory requirements and the design basis are correctly translated into specifications, drawings, procedures, and instructions." Contrary to the above, the licensee failed to ensure that measures were established to assure that applicable design basis were correctly translated into specifications, drawings, procedures, and instructions. Specifically, when designing the bypass circuitry for the emergency diesel generator ground fault trip function, the licensee failed to ensure that the associated electrical components were adequately designed for the continuous duty they would have to withstand under bypassed trip conditions. This could result in an ignition source and subsequent fire in the area under these conditions. This finding was entered into the licensee's corrective action program as Condition Report 201102064. Because this violation was of very low significance (Green) and has been entered into the licensee's corrective action program, this violation is being treated as a noncited violation consistent with the NRC Enforcement Policy: NCV 05000483/2011006-02, "Failure to Adequately Design the Emergency Diesel Generator Ground Fault Protection Circuitry."

.3 Motor Control Center NG01

a. Inspection Scope

The team reviewed the updated safety analysis report, system design criteria, selected drawings, and operating procedures for motor control center NG01. The team also performed walkdowns, and held discussions with cognizant licensee individuals. Specifically, the team reviewed:

- The motor control circuit bucket replacement program
- The analysis for the bypass mode of thermal overload protection
- The effect of bypassing on other circuit components such as the contactor, cable, thermal element, and circuit breaker
- System grounding of motor control center
- Vendor manuals to ensure adequate sizing of bus components were utilized
- Maintenance activities to ensure the components are being maintained in accordance with vendor recommendations

- Voltage drop calculations to verify sufficient voltage available at individual component control devices, and that the most limiting battery voltage was used to determine the minimum voltage available at the device

b. Findings

No findings were identified.

.4 Startup Transformer XMR01

a. Inspection Scope

The team reviewed the updated safety analysis report, system description, the current system health report, selected drawings, maintenance and test procedures and condition reports. This review included the licensee's design basis documentation as well as various calculations, procedures, and test results. The team also performed walkdowns and conducted interviews with system engineering personnel to ensure the capability of this component to perform its required design basis function. Specifically, the team reviewed:

- Periodic maintenance, surveillance testing, and Doble test results
- Oil quality, dissolved gas trending, and transformer oil sample data
- Thermography, meggar tests, winding resistance tests, and power factor tests
- Voltage analysis, differential relay settings, startup transformer cable tray support, plant load flow calculations

b. Findings

No findings were identified.

.5 Emergency Diesel Generator Heating, Ventilation, and Air Conditioning Exhaust Tornado Dampers

a. Inspection Scope

The team reviewed the updated safety analysis report, design bases documents, calculations, and recent corrective and preventive maintenance of the emergency diesel generator heating, ventilation, and air conditioning exhaust tornado dampers. This review included interviews with the cognizant design and system engineering personnel and component walkdowns to verify the configuration and capability of these components to perform their required function. Specifically, the team reviewed:

- Past condition reports related to damper performance
- Vendor documents, procedures, and test results related to damper design, maintenance, and performance

- The capacity of the dampers to perform their required function in the event of a postulated tornado event

b. Findings

One licensee-identified violation was identified (Section 4OA7).

.6 DC Bus NK01

a. Inspection Scope

The team reviewed calculations associated with DC Bus NK01. The team conducted walkdowns of DC Bus NK01and associated battery and battery chargers. Specifically the team reviewed:

- The termination of conduits to assure use and configuration of flexible conduits
- Cleanliness of batteries including signs of acid leakage and battery post corrosion
- Termination of incoming and inter-cell cables to the battery cells
- The calculation for determining the adequacy of voltage at end devices

b. Findings

No findings were identified.

.7 Inverter NN12

a. Inspection Scope

The team reviewed the updated safety analysis report, system description, the current system health report, selected drawings, maintenance and test procedures and condition reports. This review included the licensee's design basis documentation as well as various calculations, procedures, and test results. The team also performed walkdowns and conducted interviews with system engineering personnel to ensure the capability of this component to perform its required design basis function. Specifically, the team reviewed:

- Station blackout analysis, relay settings, heat loads in electrical equipment, 120 VAC Class 1E instrument AC short circuit study, voltage drop study, and backup supply feeder cable ampacity study calculations
- DC input voltage, AC output voltage, inverter output frequency, and inverter currents trends

- System health issues and recent corrective action reports
- Thermography, clean and inspect work instructions, and overhauls

b. Findings

No findings were identified.

.8 4160 Volt Switchgear NB01

a. Inspection Scope

The team reviewed the updated safety analysis report, system description, the current system health report, selected drawings, maintenance and test procedures and condition reports. This review included the licensee's design basis documentation as well as various calculations, procedures, and test results. The team also performed walkdowns and conducted interviews with system engineering personnel to ensure the capability of this component to perform its required design basis function. Specifically, the team reviewed:

- DC control circuit voltage drops, verification of voltage analysis, protective relay setpoints, plant load flow, and short circuit calculations
- Circuit breaker and relay maintenance, testing, and trending
- Relay calibration, circuit breaker cleaning, inspection, and thermography
- Circuit breaker alignment during shutdown and operation and preventative maintenance

b. Findings

No findings were identified.

.9 Steam Generator A Blowdown Line Isolation Valve BM-HV-001

a. Inspection Scope

The team reviewed the updated safety analysis report, operating procedures, current system health report, selected drawings, operating procedures, and corrective action documents associated with the selected steam generator blowdown line isolation valve. This review included interviews with cognizant design and system engineering personnel and component walkdowns to verify the configuration and capability of this component to perform its required function. Specifically, the team reviewed:

- Past condition reports related to the performance of this valve
- Calculations, procedures, and test results related to valve performance including in-service testing

- Valve thrust calculations and stroke test results to verify the capability of the valves to perform its function under the most limiting conditions

- Calculations to verify the capability of the valve to isolate this line in the event of a secondary system isolation signal

b. Findings

No findings were identified.

.10 Train A Essential Service Water High Density Polyethylene Piping EF-003-AZC

a. Inspection Scope

The team reviewed the updated safety analysis report, current system health report, selected drawings, and corrective action documents associated with the essential service water high density polyethylene piping. This review included interviews with cognizant design and system engineering personnel and component walkdowns to verify the configuration and capability of the piping to perform its required safety function. Specifically, the team reviewed:

- Condition reports related to the performance of this piping

- Calculations, procedures, and test results related to post-installation piping performance including inservice testing

- Calculations, procedures, and inspections associated with the interface between the high density polyethylene piping and the rest of the steel essential service water piping.

b. Findings

No findings were identified.

.11 Train A Containment Recirculation Sump to Residual Heat Removal Pump Suction Isolation Valve EJHV8811A

a. Inspection Scope

The team reviewed the updated safety analysis report, current system health report, selected drawings, and corrective action documents associated with the Train A containment recirculation sump to residual heat removal pump suction isolation valve EJHV8811A. This review included interviews with cognizant design and system engineering personnel. Specifically, the team reviewed:

- Calculations, procedures, and test results related to valve performance including in-service testing

- Valve stroke test results to verify the capability of the valves to perform its function under the most limiting conditions

- Procedures related to emergency operation of the valve during Loss of Coolant Accidents including observation of operator actions during performance of a simulator scenario

b. Findings

No findings were identified.

.12 Emergency Core Cooling System Accumulator Tank TEP01A

a. Inspection Scope

The team reviewed the updated safety analysis report, system design criteria, current system health report, selected drawings, surveillance procedures, and past corrective action reports for the accumulators, with focus on tank TEP01A. The team interviewed the system engineer to discuss the overall health and surveillance procedures of the accumulators. Further, the team interviewed engineers from the instrument and control discipline to discuss the level transmitter instrumentation scaling and uncertainty calculations. Specifically, the team reviewed:

- Scaling calculations addressing the re-baselining of the elevations of the accumulator level transmitters. Also, associated accumulator level instrumentation uncertainty calculations were reviewed
- Surveillance, maintenance and operations procedures
- Test results of technical specification surveillances

b. Findings

No findings were identified.

.13 Ultimate Heat Sink

a. Inspection Scope

The team reviewed the updated safety analysis report, system design criteria, current system health report, selected drawings, operating procedures, and past corrective action reports for the ultimate heat sink. The team discussed the current health and condition of the ultimate heat sink in addition to the essential service water pumps with the system engineer during a walkdown of the cooling towers and pumps. Specifically, the team reviewed:

- Calculations addressing cooling tower and essential service water pump design basis performance requirements
- Detailed comparison of original and replacement essential service water pump curves

- Instrument uncertainty calculations which translate essential service water performance requirements into technical specification surveillance acceptance criteria

- Corrective action reports and associated documents, including operator night orders, which address single failure criteria

- Procedures for the operation of the ultimate heat sink to address mitigation of single failure criteria and accident conditions including observations of:

    - Walkthrough of the mitigation actions for the failure of a ultimate heat sink cooling tower fan

    - Actions following a failure of EFHV0065, Ultimate Heat Sink Bypass Valve following a Loss of Coolant Accident during the performance of a simulator scenario

b. Findings

No findings were identified.

.14 Non-Safety Auxiliary Feedwater Pump PAP01

a. Inspection Scope

The team reviewed modification MP-0032, "Installation of Non-Safety Auxiliary Feedwater Pump." This pump was designed and installed to improve the mitigating systems performance index for the auxiliary feedwater system that had been judged to be too low to allow adequate system maintenance. The team reviewed the non-safety-related pump PAP01 as an additional safety-related pump. Accordingly, the team reviewed the updated safety analysis report, system design criteria, current system health report, selected drawings and the design basis document for performance requirements of the safety-related auxiliary feedwater pumps. Further, the team discussed the pump design and installation with both the system engineer and design engineers. Specifically, the team reviewed:

- Calculations addressing the functional requirements of auxiliary feedwater pumps

- Calculations demonstrating the capability of the non-safety auxiliary feedwater pump to satisfy design basis accidents; these included pump curves adjusted for eventual degradation coupled with system hydraulic resistance

- Post-test results and projected testing plans for the recently installed non-safety auxiliary feedwater pump

- The physical setting and installation condition of the non-safety auxiliary feedwater pump

- Procedural guidance for supplying power to the pump including observation of operator actions during a walkthrough of alignment of the electrical system to supply power to the pump

b. Findings

No findings were identified.

.15 Residual Heat Removal Pump PEJ01A

a. Inspection Scope

The team reviewed the updated safety analysis report, system design criteria, current system health report, selected drawings, operating procedures, and past corrective action reports for residual heat removal pump PEJ01A. The team interviewed the system engineer to discuss overall health and condition of the residual heat removal system and pumps. Further, the team interviewed in-service testing engineers responsible for maintaining and updating the required technical specification surveillance procedures. Also, the team interviewed instrumentation and control engineers responsible for performing the associated instrumentation uncertainty calculations. Specifically, the team reviewed:

- Safety-related calculations addressing required residual heat removal pump performance requirements during design bases accidents

- Calculations addressing the uncertainties of the instruments used to verify pump performance during required technical specification surveillances; the main focus was on the measurement of pump flow and associated developed head. The calculation used to evaluate flow uncertainty for the residual heat removal low flow alarm setpoint was also reviewed

- Quarterly and full flow surveillance procedures and test results used to verify required residual heat removal pump performance

b. Findings

Introduction. The team identified a Green noncited violation of 10 CFR Part 50, Appendix B, Criterion III, Design Control, which states, in part, that "measures shall be established to assure that applicable regulatory requirements and the design bases are correctly translated into specifications, drawings, procedures, and instructions." Specifically, the calculation used to establish a residual heat removal system low flow setpoint was found to be incorrect, and non-conservatively low. In turn, the resultant setpoint used to alert operators to a possible low flow condition was also non-conservatively low. As a result, the plant could have operated at flows less than those required to ensure adequate mixing and heat removal.

Description. Plant operations in Mode 6, refueling, require that the residual heat removal system flow through the reactor coolant system vessel be no less than 1000 gpm. Flows at or above this value ensure that the reactor coolant system water temperature remains

below 140 °F, and further, that no boron plate-out takes place. This value is specified in the safety evaluation report related to License Amendment No. 42, (March 27, 1989), Item 2.2, "Reduction in Required Residual Heat Removal System Flowrate." Operators are to be alerted with a control room alarm whenever the flow falls below this value. In order to ensure that the residual heat removal system flow remain above 1000 gpm, the uncertainty of the flow measuring instrumentation must be accounted for, and this evaluation was performed in calculation EJ-05, "Residual Heat Removal Low Flow Alarm Setpoints." When the team reviewed this calculation it was identified that the value obtained for the flow element uncertainty was in error in the non-conservative direction. In turn, use of this incorrect flow element uncertainty yielded a non-conservative estimate of the overall flow uncertainty, and further, resulted in establishing a non-conservatively low, low flow alarm setpoint. This finding was entered into the licensee's correction action program as Condition Report 201101750 on March 3, 2011.

Analysis. The team determined that the failure to adequately analyze the uncertainty in measurement of residual heat removal system flow, and the impact of this failure, was a performance deficiency. This finding was more than minor because it was associated with the design control attribute of the Mitigating Systems Cornerstone and affected the cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Specifically, the design basis analysis, and plant instrumentation, did not ensure that, while operating in Mode 6, the control room operators would be alerted whenever the residual heat removal system flow through the reactor coolant system was below the required value of 1000 gallons per minute. In accordance with NRC Inspection Manual Chapter 0609, Attachment 4, "Phase 1 - Initial Screening and Characterization of Findings," the issue was determined to have very low safety significance (Green) because it was not a design or qualification deficiency, did not represent a loss of system safety function, and did not screen as potentially risk significant due to a seismic, flooding, or severe weather initiating event. This finding did not have a crosscutting aspect because the most significant contributor did not reflect current licensee performance.

Enforcement. The team identified a Green noncited violation of 10 CFR Part 50, Appendix B, Criterion III, "Design Control," which states, in part, that "Measures shall be established to assure that applicable regulatory requirements and the design basis are correctly translated into specifications, drawings, procedures, and instructions." Contrary to the above, the licensee failed to establish measures to assure that applicable regulatory requirements and the design basis are correctly translated into specifications, drawings, procedures, and instructions. Specifically, as of March 3, 2011, the Mode 6 residual heat removal system low flow alarm setpoint did not adequately account for flow measurement uncertainties, and consequently was non-conservative. The licensee has entered the violation into their corrective action program as Condition Report 201101750. Because this violation was of very low safety significance (Green) and has been entered into the licensee's corrective action program, this violation is being treated as a noncited violation, consistent with the NRC Enforcement Policy: NCV 05000483/2011006-03, "Inadequate Residual Heat Removal Flow Alarm Setpoint."

4OA6 Meetings, Including Exit

On March 18, 2011, the team leader presented the inspection results to Mr. F. Diya, Vice President Nuclear Operations and Mr. C. Reasoner, Vice President Engineering, and

other members of the licensee's staff. The licensee acknowledged the findings during the meeting. While some proprietary information was reviewed during this inspection, no proprietary information was included in this report.

4OA7 Licensee-Identified Violations

The following violation of very low safety significance (Green) was identified by the licensee and is a violation of NRC requirements which meets the criteria of the NRC Enforcement Policy for being dispositioned as a noncited violation.

10 CFR Part 50, Appendix B, Criterion XI, "Test Control," states, in part, that "a test program shall be established to assure that all testing required to demonstrate that structures, systems, and components will perform satisfactorily in service is identified and performed in accordance with written test procedures which incorporate the requirements and acceptance limits contained in applicable design documents." Contrary to the above, the licensee failed to establish a test program to assure that all testing required to demonstrate that structures, systems, and components will perform satisfactorily in service is identified and performed in accordance with written test procedures which incorporate the requirements and acceptance limits contained in applicable design documents. Specifically, as of December 7, 2010, the licensee did not have an established test program to assure that the identified emergency diesel generator room tornado dampers would function as designed during a tornado event. The tornado dampers must close when a tornado occurs in the vicinity of the emergency diesel generator room to prevent damage to the exhaust conduits, which provide combustion air for the diesel engines. If the dampers do not close as required, the conduits may collapse due to air pressure fluctuations caused by the tornado and close off the combustion air, thus starving the engines and shutting them down. The inspectors determined that the failure to establish a test program was a performance deficiency. This finding was more than minor because, if left uncorrected, the performance deficiency would have the potential to lead to a more significant safety concern. In accordance with Manual Chapter 0609, Attachment 4, "Phase 1 - Initial Screening and Characterization of Findings," a significance determination screening was performed and determined this finding was of very low safety significance (Green) because it was not a design or qualification deficiency, did not represent a loss of system safety function, and did not screen as potentially risk significant due to a seismic, flooding, or severe weather initiating event. This finding was entered into the licensee's corrective action program as Condition Report 201011278.

SUPPLEMENTAL INFORMATION

KEY POINTS OF CONTACT

Licensee Personnel

F. Diya, Vice President Nuclear Operations
C. Reasoner, Vice President Engineering
S. Abel, Acting Manager, Engineering Services
S. Banker, Manager, Protective Services
R. Barton, Manager, Training
J. Blevins, Supervising Engineer, Engineering Services
G. Bradley, Manager, Nuclear Operations
T. Carr, Safety Analysis Engineer
S. Edwards, ECP Manager
T. Elwood, Supervising Engineer, Regulatory Affairs
L. Graessle, Director, Plant Support
M. Hillstrom, Supervising Engineer, Nuclear Oversight
J. Hutchison, Engineer, Engineering Support
S. Kovaleski, Acting Assistant Manager, Engineering Services
G. Kremer, Assistant Manager, Plant Engineering
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K. Lingenbardt, Engineer, Safety Analysis
S. Maglio, Manager, Regulatory Affairs
S. Maxwell, Operating Supervisor, Operations Training
M. McLachlan, Manager, Engineering Services
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J. Pitts, Supervising Engineer
B. Price, Operating Supervisor, Operations
L. Sandbothe, Manager, Plant Support
J. Sellers, Acting Supervisor, Engineering Services
E. Smith, Auditor, Nuclear Oversight
T. Stotlur, Supervising Engineer, Engineering Services
D. Tuley, System Engineering
N. Weber, Engineer, Engineering Services

NRC Personnel

D. Dumbacher, Senior Resident Inspector
J. Groom, Resident Inspector

LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

Opened and Closed

05000483/2011006-01	NCV	Failure to Update the Updated Safety Analysis Report (1R21.2.1)
05000483/2011006-02	NCV	Failure to Adequately Design the Emergency Diesel Generator Ground Fault Protection Circuitry (Section 1R21.2.2)
05000483/2011006-03	NCV	Inadequate Residual Heat Removal Flow Alarm Setpoint (Section 1R21.2.15)

LIST OF DOCUMENTS REVIEWED

Procedures

NAME	TITLE	REVISION / DATE
OSP-BM-V001A	S/G Blowdown System Valve Operability	13
APA-ZZ-00356	Pump and Valve Inservice Test Program	17
CSP-ZZ-07350	Diesel Fuel Oil Testing Program	23
CTP-ZZ-02233	Biodiesel Determination	0
ECA-0.0	Loss of All AC Power	13
EOP Addendum 37	Backup Station Blackout Diesel Generators	3
EOP Addendum 38	Non Safety Auxiliary Feedwater Pump	0,1
EOP Addendum 39	Alternate Emergency Power Supply	0,3
OTA-KC-01008	KC-008 Message File	8
APA-ZZ-00742	Control of Ignition Sources	17
OTA-KJ-00121	Annunciator Response Procedure, Diesel Generator NE01 Control Panel	15
OTA-RK-00016	Diesel Generator NE01 Undervoltage or Underfrequency	1
I.L. 41-101S	Westinghouse Installation, Operation, and Maintenance Instructions For Type CO Overcurrent Relay	68
ITL-EJ-0P614	Loop-Pressure: RHR Pump "A" Discharge Pressure	8
ISL-EP-0L950	Safety Injection Accumulator Tank (TEP01A) Level Channel Check	17
OSP-EJ-P001A	Residual Heat Removal Train A Inservice Test – Group A	48
OSP-EJ-PV04A	Train A Residual Heat Removal and Reactor Coolant System Check Valve Inservice Test – IPTE	3,4
OSP-EP-V0001	Accumulator Isolation Valves	6
OSP-EP-V0004	Safety Injection Accumulator Discharge Isolation and Safety Injection Test Line Isolation Valve Inservice Test	4

NAME	TITLE	REVISION / DATE
OSP-EP-V0006	Safety Injection Accumulator Discharge Check Valve Test – IPTE	6
OSB-BB-V006	Reactor Coolant System Pressure Isolation Inservice Tests-IPTE	39
OTS-AP-00001	Non-Safety Auxiliary Feedwater Pump	0
EDP-ZZ-01113	Electrical Equipment Predictive Performance Manual	7
XFMR-OIL-0024	Perform Power Factor Test and Oil Analysis for Startup Transformer	1
OSP-NB-00001	Class 1E Electrical Source Verification	35
MPE-ZZ-QY200	Inspection, Test and Calibration of Protective Relays Associated with 4.16KV Busses NB01 and NB02	10
MPE-ZZ-QY006	Inspection/Test/Calibration of Protective Undervoltage Relays GE Type IA V54	5
MPE-ZZ-QY015	Inspection/Test/Calibration of Protective Instantaneous Undervoltage Relays GE Type NGV13B	4
MPE-ZZ-QY001	Inspection/Test/Calibration of Protective Overcurrent Relays GE Type IAC	5
MPE-ZZ-QY004	Inspection/Test/Calibration of Protective Instantaneous Overcurrent Relays GE Type PJC	6
MPE-ZZ-QY033	Inspection/Test/Calibration of Protective Overcurrent Relays GE Type IA C66K	5
APA-ZZ-00500	Corrective Action Program	52
APA-ZZ-00500	Operability and Functionality Determinations (Appendix 1)	13
APA-ZZ-00500	Trending Program (Appendix 10)	3
APA-ZZ-00500	Regulatory Issue Summary 2005-20 Degraded and Nonconforming Condition Resolution (Appendix 11)	5
APA-ZZ-00330	Preventative Maintenance Program	36
APA-ZZ-00395	Significant Operator Response Timing	16,17
OTO-BB-00010	Shutdown LOCA	2
EOP Addendum 23	Local CST Emergency Fill	3
OTO-NB-00001	Loss of Power to NB01	21
CPTM-OPS	Operations Programs	21
EOP Addendum 21	Local Start of Emergency Diesel Generator	1
OTA-KJ-00121 Addendum 7D	Generator Protective Relay	0
ES-1.3	Transfer to Cold Leg Recirculation	10
E-1	Loss of Reactor or Secondary Coolant	13
OTA-RK-00018 Addendum 47B	Refueling Water Storage Tank Level Low-Low 2	1
OTA-RK-00018 Addendum 49C	Residual Heat Removal Loop 1 Flow Low	1
OTA-RK-00018 Addendum 50C	Residual Heat Removal Loop 2 Flow Low	1
OTO-RK-00001	Loss of Control Room Alarms	19
OTA-RK-00016 Addendum 31E	MG08 Bus Undervoltage/Overvoltage	1

NAME	TITLE	REVISION / DATE
APA-ZZ-00152	Emergent Issues Response	7
OTA-RK-00020 Addendum 54E	Ultimate Heat Sink Cooling Tower Trouble	1
ODP-ZZ-00001 Addendum 01	Annunciator Response	7
OTO-NK-00002	Loss of Vital 125 VDC Bus	9
OTO-NK-00001	Failure of NK Battery Charger	9
APA-ZZ-00102	EPO/OTO Writer's manual	11
APA-ZZ-00103	EOP Program Procedure	11
ODP-ZZ-00030	EOP Implementation Guide	6
EOP Addendum 17	Securing ESW Train Due to UHS Cooling Tower Trouble	0
E-O	Reactor Trip or Safety Injection	13

Calculations

NAME	TITLE	REVISION / DATE
ZZ-225	NN Inverter Backup Supply Feeder Cable Ampacity Study	0
E-H-9	System NG/PG Relay Settings	3
B-13	Verification of Voltage Analysis at Callaway	0
H-13	System PJ&PK Relay Settings	4
ZZ-62	Plant Load Flow Calculation	9
NG-22	NG Load Center Setpoint Calculation	1
NB-05	System NB Protective Relay Setpoints	4
ZZ-145	Short Circuit Calculation	2
AL-29	Auxiliary Feedwater System Performance During a Feedline Break	2
AL-30	Auxiliary Feedwater System Performance During a Normal Feedwater Flow and Loss of Non-Emergency	4
AL-40	Auxiliary Feedwater Flow Instrument Uncertainty for Emergency Operating Procedures	0
57035-M-003	Non-Safety AFW Pump Analysis and System Resistance Curve	0
J-2F01	Accuracy of Standard Orifice Plates	0
EP-01	Calculations for Safety Injection Accumulator Level Transmitters and Volume Calculations for Safety Injection Tanks	1
EJ-35	Residual Heat Removal Pump Minimum Flow Recirculation Line Orifice Sizing	
EJ-40	Residual Heat Removal Flow Instrument Uncertainty for Emergency Operating Procedures	0
EF-71	RHR Cooldown Reanalysis (Addendum 1)	1
CN-TA-03-5	LONF/LOAC Analysis for Callaway (SCP) RSG Program – Increased FWIV Stroke Time	1
CN-LIS-03-36	Callaway (SCP) Appendix K BASH-EM Analysis for Replacement Steam Generator (RSG) Program	0

NAME	TITLE	REVISION / DATE
EJ-05	Residual Heat Removal Low Flow Alarm Setpoints	0
ITL-EJ-0P614	Non-Safety-Related Calculation for Uncertainty or Residual Heat Removal Discharge Pressure Transmitter Loop, EJ-PI-614	November 17, 1992
ISL-EP-0L950, 00560090	Loop Tolerance Calculation for EP-LT 950	-
BN-04	Refueling Water Storage Tank Transmitter Scaling and Level Setpoint Calculation	3
BN-23	Calculation of Vent Stack Modification for Design Basis Atmospheric Conditions	1
BN-24	Required Submergence for Refueling Water Storage Tank Suction Pipe for Vortex Prevention	0
XX-94	Flows EOP Action Values, Updates Due to Replacement Steam Generator Modification	1
EF-38	SGT Calculation (Steam Generator Replacement Project)	1
EF-54	Ultimate Heat Sink Thermal Performance, (Special Case)	3
EF-45	Acceptance Criteria Used in ESW Flow Balance Procedures	8
ZZ-549	Alternate Emergency Power Supply Load Flow Calculation	0
NK-10	NK System DC Voltage Drop	2
NB-05	System NB protective Relay Setpoints	4
ZZ-548	Alternate Emergency Power Supply Protective Relay Settings	0
E-B-10	Voltage Drop in Motor Control Center Control Circuits	3
NG-23	Motor Control Center Setpoint Calculation	0
FL-10	Flooding of Diesel Building Rooms	0
BM-14	BMHV0001 Capability and Margin Calculation	0
GM 227	Diesel Generator Ventilation	1
BG-TOP-3-A	Tornado and Extreme Wind Design Criteria for Nuclear Power Plants	3
GM-03	Emergency Diesel Generator Room Steady-State Temperature	1
M-GM-02-C	Diesel Generator Room Temperature	0
M-HV-233	Tornado Design Basis Event	0
AABD 5.0	Loss Of Normal Feedwater Flow and Loss Of Non-Emergency AC Power to the Station Auxiliaries	4
57035-M-003	Non-Safety AFW Pump Analysis and System Resistance Curve	0
ARC-761	Update Bolt Ring Analysis with New Bolt Loads	0
EF-113	Evaluation of Independent Pipe Products' 36" IPS Bolt Ring to ASME Section III Design Requirements	0

Drawings

NAME	TITLE	REVISION / DATE
M-22EJ01	P&ID Residual Heat Removal System	59
M-22AL01	P&ID Auxiliary Feedwater System	36
M-23EJ01	Piping Isometric Residual Heat Removal System Auxiliary Building – "A" Train	19
M-U2EF01	P&ID Essential Service Water System	62
M-22EF01	P&ID Essential Service Water System, Sheet 1	74
M-22EF01	P&ID Essential Service Water System, Sheet 2	73
J-24EJ03	Instrument Isometric Drawing, RHR PUMP "1A" Discharge	0
N-1189-3	MK 52 Orifice Plates (Vickery-Sims Inc.)	0
M-22AP01	P&ID Condensate Storage and Transfer System	27
M-22EP01	P&ID Accumulator Safety Injection	17
37770B	Pacific Pumps Curve for RHR Pump B, (S1748	July 15, 1977
37770A	Pacific Pumps Curve for RHR Pump A, (S1747)	July 20, 1977
N-1244	Ingersoll-Rand Pump Curve, NS AFP, SN 1178188	0
M-23EP01	Piping Isometric Accumulator Safety Injection System Loop No. 1 & 4	11
M-23BN01	Piping Isometric Borated Refueling Water STG SYS Auxiliary Building	12
M-109-00081	Peripheral Roof Vent, (System AP, RWST)	4
M-109-00012	Details—Condensate Storage Tank	007
M-109-00010	Details—Condensate Storage Tank	012
C-U203	Electrical Manholes, Plans, Sections & Details	6
C-U201	Yard Pipelines & Elec. Duct Banks, Plans & Schedules	8
C-U201	Yard Pipelines & Elec. Duct Banks, Plans & Schedules	9
E-UR0221	Raceway Plot Plan, ESW System Plan & Sections	9
E-21001	Main Single Line Diagram	15
E-21001	Main Single Line Diagram (For Mod. Pkg. 10-0038)	16
E-21MA01	Main Generator Single Line Metering & Relaying Dgm.	18
E-21MR01	Startup Trans., Single Line Metering & Relaying Dgm.	5
E21NB01	Lower Medium Voltage System Class 1E 4.16 kV Single Line Meter & Relay Dgm.	7
E-21NB02	Lower Med. Voltage System Class 1E 4.16 k Single Line Meter & Relay Dgm	8
E-21NB02	Lower Med. Voltage System Class 1E 4.16 k Single Line Meter & Relay Dgm. (For Mod. Pkg. 10-0038)	N/A
E-21010	DC Single Line Diagram	10
E-21NKO1	Class 1E 125 V DC System Meter & Relay Dgm.	8
E-21NKO2	Class 1E 125 V DC System Meter & Relay Dgm.	8
E-21010A	DC Main Single Line Dgm. (PK03 & PK04 Bus)	5
E-U1001	Single Line Dgm. Essential Service Water System	6
E-1028-00031	Type HMCP Motor Circuit Protector	2
E-21NE01	Standby Generation System Meter & Relay Dgm.	7
M-22LE02	P&ID, Control & Diesel Gen. Bldg. Oily Waste System	5
M-23LE06	Piping Isometric, Oily Waste Sump Discharge from Comm. Corridor & DG Bldg. to Turbine Bldg.	1

NAME	TITLE	REVISION / DATE
M-093-0053	Crane-Deming Pump Curves	1
M-650-00029	Sprinkler System DG Bldg.	11
E-21PG06	Low Voltage System, Non Class 1E 480 V Single Line Meter & Relay Dgm.	9
E-23PG05	Low Voltage System, Non Class 1E 480 V Three Line Meter & Relay Dgm.	4
M-018-00688	Generator Control & Relay Panel (NE106)	8
E-23NE11	Schematic Diagram 4.16 kV Feeder Breaker 152NB0211	10
E-23KJ01A	Schematic Dgm. DG KKJ01A Engine Control (Start/Stop Ckt.)	14
E-23NE10	Schematic Diagram 4.16 kV DG NE01 Fdr. Bkr. 152NB111	11
8600-X-90988	Single Line Dgm. AEPS	0
8618-W-96867	345 kV Switchyard One Line Dgm.	9
M093-00123	Motor Data Sheets Crane Deming Pumps	0
E-21025	Relay Setting Tabulation & Coordination Curves	12
Figure 8.1-1	System Map	14
CS-16790	Okonite Co., 15 kV Cable Construction	2/28/11
M-22BM02	Piping & Instrumentation Diagram Steam Generator Blowdown System	16
M-22EF01(Q)	Piping & Instrumentation Diagram Essential Service Water System	72
M-22EF02(Q)	Piping & Instrumentation Diagram Essential Service Water System	71
12937-13	Schedule for Q-Listed Tornado Dampers	A
E-12NF01	Load Shedding and Emergency Load Sequencing Logic	4
E-13EJ04A	Schematic Diagram Residual Heat Removal Pump 1 to Charging Pump Valve	5
E-13EJ04B	Schematic Diagram Residual Heat Removal Pump 2 to Safety Inj. Pump Valve	7
J-12AL04	Control Logic Diagram	1
J-12EG02	Component Cooling Water System Demineralized Water Make-Up to Component Cooling Water Surge Tank	7
KP1909W	Logic Block Diagram Engineered Safety Features Actuation System	0
M-11EG01	System Flow Diagram Component Cooling Water	2
M-12AL01	Auxiliary Feedwater System	10
M-12BN01	Borated Refueling Water Storage Tank	14
M-12EG01	Component Cooling Water System	16
M-12EG02	Component Cooling Water System	19
M-12EG03	Component Cooling Water System	9
M-12EJ01	Residual Heat Removal System	43
M-12EM01	High Pressure Coolant Injection System	37
M-12GM01	Diesel Generator Building Heating Ventilation Air Conditioning	1
M-13EF06	Piping Isometric	15
E-11NK02	Class 1E 125V DC System Meter and Relay Diagram	8
E-11NB02	Lower Medium Voltage System Class 1E 4.16 kV Single Line Meter and Relay Diagram	2

NAME	TITLE	REVISION / DATE
E-13GM04-A	Schematic Diagram Diesel Generator Building Exhaust Damper	0
E-018-00176	Motor Control Center Layout Specifications	11
J-12GM01A	Diesel Generator Building HVAC Supply Fan	1
E-018000177	Motor Control Center Layout Specifications	12
E-13GM01	Schematic Diagram Diesel Generator Ventilation Supply Fan	4
E-13GM01A	Schematic Diagram Diesel Generator Ventilation Supply Fan	4
E-11NB01	Lower Medium Voltage System Class 1E 4.16 KV Single Line Diagram Meter and Relay Diagram	2
E-11PG20	Low Voltage System Non-Class 1E Motor Control Center Summary	105

Engineering Reports

NUMBER	TITLE	REVISION / DATE
10-00620	Evaluation of Guillotine Break in Non-Safety Wolf Creek Nuclear Operating Company Piping	October 26, 2010
E-009B-00003	Evaluation of Siemens 3EF1 036 Surge Limiters	W02
VTS-021111-R	Fairbanks Morse, Wolf Creek Nuclear Power Station, Heat Exchanger Analysis Supplemental Report	November 11, 2002
M-018-01502	Load Table Analysis Submittal W01– Frequency and Voltage Dip Study – 2001	January 4, 2002

Condition Reports

200700115	200107586	200201916	200906493	200909477
200600074	200103384	200901849	201010873	200901030
201005892	201011217	200908197	201008001	200700970
201100511	200601140	201001024	201000676	200608902
201004947	200903925	201001793	200900683	200809098
200810603	201008001	201010444	200909337	200804397
200810935	200701308	200905507	201005892	200710351
201001813	200601141	200900348	200805684	200805860
200602875	200812885	200705263	201005105	201004091
200904560	200802297	200900667	201101296	200810874
200806669	201003275	200802042	200707158	200909066
200602859	201011628	200903560	201101246	200700023
201101327	201005041	200605882	201005479	201101583

Condition Reports Generated During this Inspection

201101328	201101794	201101335	201102064	201101757

201101595	201102002	201101678	201101777	201101957
201101750	201102050	201101721	201101726	201102079
201101754				

Maintenance Work Orders

05513282	08512419	07505161	P670788	08514386
08511397	08511717	04503689	10514535	08510604
10004486	07503806	P697942	09510526/500	08511596
07505991	07515092	10513967	05516282-500	07513486/331
08511398	08514385	P621019	05516282-920	P651285
07502342	07504731			
06520638				

Miscellaneous

NUMBER	TITLE	REVISION / DATE
PR-01	RHR Pump Discharge Pressure Gauge Requirements, Proposed Alternative	October 13, 2010
NET 98-0035	Callaway Response to NRC Information Notice 97-90	March 10, 1998
MP 06-0029/000.1	Engineering Disposition: Remove Instrumentation EJ-LE-7A and EJ-LE-8A from Containment Sumps	0
UOMO 04-0021	Ameren letter to Volian Enterprises, Instrumentation Information	June 28, 2004
M-627A	Dampers Specification Multi-System As-Built	13
RFR 09042A	D/G Ventilation System Tornado Dampers	A
RFR 17044	Classification of S/G Blowdown Isolation Valves	D